A ~~3245-628~~

# PROCESS FOR MANUFACTURING HOT ROLLED STEEL STRIPS

Insert A1

~~Description~~

A The invention is directed to a process for ~~the production of~~ producing hot-rolled steel strip from continuously cast precursor strip in at least two deformation stages, each A deformation stage having one or more roll stands, ~~wherein initial rolling is carried out~~ Initial rolling is performed in the first deformation stage at the output speed at which the precursor strip exits from the continuous casting plant and the intermediate strip thus produced is coiled prior to the second deformation stage at the output speed at which it exits from the Insert A2 ~~first deformation stage, wherein the coil is uncoiled after reaching the coil weight and~~ is supplied to the second deformation stage for finish rolling at the initial roll pass speed and is then coiled in the desired finished coil sizes.

A Insert A3 2. Description of the Prior Art

~~A process of the type mentioned above is described, for example, in the~~ German Patent 38 40 812 C2 and has become known in technical literature as the ISP process. An essential characteristic of this process is the two-stage rolling A process in which the first deformation stage is ~~carried out~~ performed directly following the A casting machine at casting speed and the second deformation stage is ~~carried out~~ performed at an appreciably higher rolling speed. These two rolling process stages are linked by A an intermediate coiling system ~~in the form of~~ including a coiling furnace in which the continuously cast slab is coiled after ~~being rolled down, wherein the weight of the~~ the inital rolling stage until the coil reaches a predetermined weight which A ~~coil~~ corresponds to the desired finished coil weight. The strand which is initially generated in an endless manner is therefore divided following the first deformation A stage when the coil weight reached in the coiling furnace is equal to the ~~weight of~~ A the ~~finished coil~~ desired finished coil weight after rolling down in the second deformation stage.

When rolling hot strip according to this process, the threading of the strip head into the coiler imposes a limit on the rolling speed because there is a risk at A very high speeds that the strip head will run up on the run-out table. ~~When~~ once the strip A head is caught in the coiler, the rolling speed could be increased ~~as much as desired~~ up to A ~~in practice within the framework of possibilities of the plant and technical~~ the plant capacity and technical

requirements.

A ~~In order to~~ To overcome the above-described limitation of rolling speed, prior art methods have been developed for endless rolling which rely on the principle of joining the precursor strips before entering the finishing train. For example, it is proposed that a plurality of precursor strips are welded together end to end in order to be able to reduce the threading-in processes and enable more or less endless rolling.

A However, welding the precursor strips together requires the use of complex installations and likewise limits the possible rolling speed.

A In the process on which the invention is based, ~~as was already mentioned,~~ precursor strips are produced by the continuous casting process and wound into coils whose weight corresponds to the weight of the finished strip coil. For this

A purpose, the precursor strip is severed after reaching the finished coil weight in the intermediate coiling station and is accordingly disconnected from the casting plant so that the strip can be uncoiled in the finishing train at high speed. However, because

A of the above-described risk ~~when~~ associated with threading the strip head into the coiler, rolling

A speeds are limited ~~so that~~ which causes considerable problems ~~occur specifically~~ when rolling thin hot strip in the order of magnitude of less than 1.5 mm. Conventional plants are therefore incapable of producing thin hot strip in large quantities.

A SUMMARY OF THE INVENTION

Proceeding from the aforementioned problems and disadvantages of the prior art, it is the object of the present invention to propose a process for producing hot-rolled steel strip in which very thin strip can also be rolled in a reliable manner at high final rolling speeds.

A According to the present invention, this object is met in that ~~in the first deformation~~

A ~~stage~~ at least 40 tons of a casting sequence ~~of the~~ from a continuous casting plant is rolled

insert AH ~~out in endless manner to form~~ intermediate strip and is coiled to form an

A intermediate coil without severing, ~~and in that after more or less endless~~ After continuous finish rolling

insert AS ~~the intermediate strip of this intermediate coil~~ is severed according to the ~~desired coil~~ desired finished coil

A weights and coiled as finished strip ~~only following the second deformation stage.~~

A insert AS ~~In a casting plant of the type mentioned above followed by a pre-deformation~~

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

insert AG ~~group~~, precursor material ~~is produced by an endless rolling process for finishing~~ in a finishing

A ~~the finishing~~ train. Contrary to the usual mode of operation in which this precursor material is cut into parts corresponding to the subsequent coil weights, the precursor

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material with the intended object of ~~endless~~ continuous rolling is not ~~cut~~ severed behind the ~~deformation group,~~ first deformation stage having a length which includes a but rather is wound, without ~~cutting,~~ severing into an intermediate coil ~~comprising a~~ plurality of finished coils. Out of this intermediate coil, a plurality of coil lengths are then finished in an endless rolling process in the finishing ~~train~~ or second deformation stage. The size of the intermediate coil is limited only by the mechanical configuration of the coiling unit and the rolling time in which the finishing train ~~can be operated~~ is operable without changing rolls. With suitable coiling devices, it is entirely possible to ~~carry out endless~~ perform continuous rolling of whole casting sequences of a continuous casting plant, but at least substantially greater tonnages can be rolled out than would be possible in plants according to the prior art.

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The process steps according to the invention appreciably increase the buffer capacity or collection capacity of the intermediate coiling system. With a coiling capacity of approximately 100 tons, for example, the buffer capacity would increase to 60 minutes per intermediate coil. Due to the higher final rolling speeds ~~which are made possible by a procedure of the type mentioned above~~ using the inventive procedure, finished hot strip with thicknesses of less than 1.2 mm can easily be produced in ~~an endless~~ a continuous manner. The yield of the plant is improved because the typical rough-rolled end or rolling tongue, which must be removed before further processing develops only for the start of the first coil and the end of the last coil behind the finishing train. Moreover, the quality of the rolling stock can be improved because the non-steady state of the initial pass impact or shock takes place only once in the first coil.

The winding of the intermediate strip to form an intermediate coil can be carried out with or without mandrel. Further, according to another feature of the invention, the metallurgical characteristics such as grain structure and phase within an intermediate coil length can be changed by changing the temperature control prior to winding the intermediate coil and/or prior to the second deformation stage and by flexible speed control.

In a further development of the invention, the geometrical characteristics, i.e., physical dimensions, of the finished coil produced from an intermediate coil are changed by suitable adjustment of the rolling parameters during the deformation of the intermediate strip within the second deformation stage.

It is advantageous when at least the edges of the intermediate strip are protected from cooling during the coiling of the precursor strip to form the

intermediate coil.

In sum, the advantages of the present process consist in the possibility of endless rolling without welding of precursor strip, endless rolling with homogeneous precursor strip characteristics with respect to temperature and geometry, increased production in the plant through higher possible rolling speeds which are no longer limited by the threading-in processes in the coiler, and in the creation of greater buffer capacity between the casting strand and the finishing train.

The process can be applied in single-strand or two-strand plants, wherein the coiling principle for the precursor strip can be carried out with a mandrel in coiling furnaces or without a mandrel in coil boxes, as they are called.